

The evolution of metalworking in the 19th century: case studies of metal covers of ecclesiastical books in Ionian islands (Zakynthos) in Greece

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ABSTRACT

Metalworking and Ecclesiastical metalworking in Greece have a long course through history. This kind of art is the metals' processing techniques that vary according to the kind of the metal and the objects that were to be constructed. The most common metals used, are gold, silver, copper, brass and less of all lead. Luxurious metallic bindings have been found in holy books. The construction of a metallic book cover needs a lot of effort and resources. In Zakynthos Island (Greece) there is a tremendous tradition in metalworking, mostly with silver and gold.

KEY WORDS: Zakynthos, metalworking, metallic book covers, 19th century, Greek folk art

INTRODUCTION

The art of metalworking, i.e. the various metal processing techniques, first appears back in the ancient times. The geometric era gave artwork of great artistic significance, such as copper boilers, tripods of the 8th and 7th century BC etc, with embossed plates and engraved representations. However, it also has a long tradition in the Greek folk art, with influences from large metalworking bases in the west and east, with Byzantine and Post-Byzantine specimens, especially in the ecclesiastical metalworking, gold and silver metalworking, copper art etc. (Giouri 1981).

This art created disciplines specializing in the type of metal and objects to be manufactured. The most common metals were gold, silver, copper, brass and less of all lead. Gold, silver and brass were especially used for the creation of ecclesiastical objects (bells, candle stands, decorative etc) (Zora, 1994).

Ecclesiastical gold and silver metalworking is one of the ecclesiastical metalwork's fields that include silver and gold objects, as well as alloys of them, of devotional character. Moreover, the study of domestic or imported objects is also included, via the finding of information regarding their manufacturing technology. The worship objects are plenty, such as the tabernacle, the Holy Grail, ecclesiastical trays etc. In the holy books, Gospels are presented luxurious metal bindings. The existence of Gospels coated with gold and

silver in each church, attach importance to the latter. In rare occasions there was a New Testament or Gospel, and starting from the end of the 19th century luxurious bindings appear in the Apostle books as well. There are also auxiliary utensils, which assist specific ceremonies, such as the tabernacle, and others, which are symbolic and more commonly used, such as the pectoral crosses of the priests, the matrix, the crutch and many more. Very important criteria for possessing luxurious ecclesiastical objects are the economic prosperity and the spread of the reputation of each temple (Oikonomaki – Papadopoulou 1998, 1980).

It is very important to be mentioned that the ecclesiastical objects are not always artworks, even in the case that the metal from which they were manufactured is valuable. In the case that an object was worn out through time it was customary to go through the process of liquidation followed by, either its re-creation or the use of the liquefied metal for another object. Frequently, of great importance are the origin, the craftsman and the style, which are also the only evidence that lead to the verification of the workshop and the craftsman, as well as of the person who made each donation (Oikonomaki – Papadopoulou, 1990).

The historical significance of the metalwork objects lies, not only in the information deriving from the study regarding their techniques or the inscription of a specific and significant artist, but also in the social and political background. The political changes that Greece has suffered have altered the artists' perception regarding the style and decoration of their works (Islamic influences or Italian in the Ionian Islands). Merchants' communication, who frequently crossed the borders of the country, as well as the marines, had a significant part in the creation of this influence. This continuous interaction throughout time is the reason for which metalworking can be categorized according to the techniques or the seasons, including the transition periods that have been given to some objects various elements from more than one style or decorative characteristics (Universal Guide of Ecclesiastical Equipment, 1998).

Gold and silver metalwork is divided in chronological stages; the first one is the post – Byzantine (up until the beginning of the 18th century), the second one is the modern Greek that includes artworks created in the period between the beginning of the 18th century and the beginning of the 20th century, which are also significantly influenced from the West (Oikonomaki – Papadopoulou, 1980).

Zakynthos island (Zante), is a small Greek island in the Ionian Sea. The island comes all the way since the ancient times and has been inhabited from the Paleolithic Age as proven by findings. In the modern history Zakynthos has been a part of the Kingdom of Naples, of the Byzantine Empire, under the Ottoman rule, occupied by the Venetians and going on under the French, Russian and British rule, until the long anticipated union with Greece in 1864, together with all the Ionian Islands.

Zakynthos has a great art history including literature, poetry, theatre, music, dance, painting (Heptanese School of Painting), metalworking and ecclesiastical metalworking etc. Having been influenced by so many cultures, Zante and the Ionian Islands contributed in the making of a special kind of folk art combined with the original Greek elements (Konomos, 1981).

TYPES OF METALWORKING

The craftsmen dealing with metalwork are divided in various categories, based on the metal they were using, and they are given a specific attribute according to the objects they were creating. Those dealing with iron were divided into craftsmen working with copper, key

makers, knife makers, tool makers, scale makers, gunsmiths, firearm gunsmiths and paddle makers. Those having copper as a main material were divided into boiler makers, coppersmiths and polishers. A number of craftsmen were making small cast tin ware; another category was the tinkers and the tinsmiths, who were working with coated iron. Those working with brass were known as “toptzides”, “koparatzides” (cannon manufacturers), brass craftsmen and “toupouktzides” (craftsmen manufacturing ormolu utensils). The two categorized that were distinguished were the lead craftsmen and the watchmakers. The craftsmen, who were working with gold and silver, are the “kougoutzides”, “dokmetzides”, those who made wires, horseshoes, coins etc (*Koufopoulos et al, 1997*).

Copper art refers to the copper processing techniques (cold forging), which, with the help of a furnace, as well as a variety of chemicals, produce a range of objects of domestic and professional use. Copper casting exists in Greece from the ancient times; already from the Geometric era the construction of large pots and statues appears, mainly made according to the lost wax method. The copper craftsmen of the modern era had permanent workshops, in contrast to the peddlers who would perform tin-plating, that were focused on the maintenance and the small repairs. Tinning (tin-plating) is the coating of a copper object’s interior with a thin layer of tin, in order for the objects to be protected from the copper oxides (*Voutiras et al, 2012*).

Brass metalworking, includes the number of the techniques through which the process of brass casting is achieved, aiming to the construction of various objects (in ecclesiastical metalwork: candelabra, inlets, candlesticks, crosses, chandeliers, bells, etc.). As an art, it became particularly known among the craftsmen of Mount Athos; from the late 19th century onwards, there are references regarding bronze objects dated back to 1758 – 1763 AD.

Metalworking of silver is a great chapter, especially in ecclesiastical metalworking. Silver processing was and still is the main manufacturing material of ecclesiastical utensils. Forging, carving, inflation and molding are the basic processing techniques of this precious metal. The manufactured objects varied in kind; nevertheless, gospel covers were also included in these (*Koufopoulos, Mamaloukos 1997*).

METALWORKING IN ZAKYNTHOS

Silver sculpturing and the creation of such metallic covers was not an unknown art in Zakynthos; it was a large opportunity for the craftsmen of the era to manufacture an abundance of distinct works made from silver and gold during the period of the economic prosperity of the place. As D. Flemotomos (1991) mentions, a number of ecclesiastical, decorative and domestic objects made their appearance. The boom happened with the arrival of the Kalarrytian craftsmen, during the pre – revolutionary era, on the island, who communicated further knowledge to the locals. In Zakynthos there was also a Union of silver and gold smiths (the guilds were also known as “Skouoles”) and it is speculated that it has been founded before 1668; the Union enforced laws in order to prevent the illegal trade of the precious metals they were using.

It is a fact that many of the objects were lost due to the disaster the place has suffered; the ability to record the craftsmen of the abovementioned objects was also lost, mainly, due to the lack of signatures on the objects found. There is a short list of craftsmen mentioned by D. Flemotomos in his work entitled “Zakynthian Craftsmen”; some of the craftsmen listed among many others are the following: Fratzeskos Chalikias, Tzouanes Margaronis, Ioannis Milatianos, Dimitris kai Ioannis Vlitto, Nikolaos Mpotsaris and Georgios Vouthoulkas.

Kalarrytes, a village in Pindos, was the birthplace of the most known silversmiths. The craftsmen who were following them and their work closely spread all over Greece and especially in its western part. Athanasios Tzimouris was the lead goldsmith and a teacher of silversmithing in Ali Pasha's court and his works that have been mainly preserved up until today are mainly ecclesiastical. Georgios – Diamantis Mpafas is one of the most significant representatives of the ecclesiastical art. Diamantis, his father, was a goldsmith in Ali Pasha's court, as well as his teacher. The silver – sculptured shrine of Saint Dionysios of Zakynthos was constructed by Georgios within a 13 year period. His art has mainly influences from the west with baroque elements in his creations (*Zagkli – Mpoziou 2009*). Athanasios Tzimouris, Diamantis and Georgios Mpafas are mentioned by Ntinios Konomos (1989), for their great contribution in the Zakynthian silversmithing but also for their distinct art works decorating the churches of the island. A. Tzimouris has been distinguished for his unique work regarding the gospel covers, as well as for the period separation of his artistic activity, one taking place in Epirus and one in Zakynthos. His works were found in the museum collection of Agios Dionysios, as well as in the church of Agia Mavra in the village of Macherado. He collaborated with Georgios Buffas and Christodoulos Gertzos, who was also his partner.

Georgios Mpafas left as well several art works in the Zakynthian heritage, which he created along with his father Diamantis. Especially significant is the information that he usually used the name of his father as a signature for their art work and for that reason it is extremely difficult to clearly distinguish which were the father's and which were the son's works. A golden sculptured gospel exists in the monastery of St. Nicolaos of the foreigners, which is a work piece of Mpafas and it dates back to 1811; another work of his is a gold coated silver sculpture, which can be found in the museum collection of Saint Dionysios; his work clearly had western influences, especially from Italy and the renaissance period, away from any local tradition (*Konomos 1989*).

METALLIC COVERS OF ECCLESIASTICAL BOOKS IN ZAKYNTHOS

The metallic bindings of the holy books are included in two different bookbinding periods; the first one is until the middle of the 16th century AD and the second one is until the 18th century AD. The first period is limited to illustrations of the animal kingdom (birds, eagles, dogs etc.), mythical creatures, such as dragons, as well as flowers and decorative elements, such as rosettes. The second period is characterized by the intense religious illustrations, as well as from the triangular and floral themes; these manufacturings mainly come from Moldovlachia and Mount Athos.

The manufacture of these coatings, based on the close reading of recorded objects from monastic collections, was mainly made by forging and had cast elements; the decoration as well, was made in different ways, engraved or impressed, with intense anaglyphs and additional techniques and elements, such as gold plating, enamel, niello coatings, precious and non – precious stones, wire decorations, metal clasps and detailed carved inscriptions. There is a mention of bookbinding plaques made from wood and covered with leather (usually dark brown) or fabric, with nailed metal plates. This type of leather bindings, with the rectangular plates, is usually from the 17th or 18th century (*Kakavas 1994, Mpallian 1994, Tselikas 2006*).

Since the 13th century, there are references to silver – gold gospels, with silk fabrics, gold anaglyphs (prints), with precious stones, colored glass stones or semi – precious stones,

with wired enameled jewelry and pearls. There are also references for materials, such as ivory, enamel, and leather, as well as anaglyph wired decorative and thick metallic nails. The enamel was used to frame the basic illustrations or the cast plates, which adorned the four edges of the covers (*Oikonomaki – Papadopoulou 1980*).

In the Ionian Islands, are presented covers, with covered velvety plates and perforated laminates, with well – known illustrations, framed with images of the prophets, the evangelists, angels and a number of floral and rococo jewelry. In the middle of the 18th century, the old binding method is used, with a central illustration (Crucifixion, Resurrection), and in the edges images of the prophets and the evangelists, or scenes from the Twelve Great Feasts, inside ellipsoidal medals with intense rococo frames and rich floral decorative covering the intermediate surfaces. A. Tzimouris's works could be also included in this group; they are characterized by a keen calligraphic style, low anaglyph, strict layout of scenes around the central theme and they are presented in different areas of the central and western Greece, where the monastery of St. Mavra of Zakynthos is also located (*Oikonomaki – Papadopoulou 1980*).

TECHNIQUES AND DECORATION OF METALLIC BOOK COVERS

The metallic book covers begin as a simple metal sheet. The creation of a metal sheet, follows a process, which although is simpler, nowadays, due to the technology evolution, it follows the same basic rules. The process frequently includes the shearing of the metal, i.e. the cutting into sheets of various sizes, the bending, a process through which the metal is formed via vertical forces it receives in a certain part of it and a type of spin, which is responsible for the creation of metallic threads. The “rolling” is a process through which the metal is formatting; in this process the latter passes through rotating metal beams, while the “stretching” is another formatting process, in which the metal receives opposing horizontal forces. The aim of both the aforementioned techniques is to flatten the metal. Finally, there are reports regarding the formation of protrusions under pressure in mold. The objects made of metal sheets usually have a greater surface for each craftsman to work with, as well as mutable thickness and high elastic deformation (*Creese 1999*).

However, there are many errors in the manufacture of these objects, such as the deformation of the metal's surface and the appearance of engravings, which requires further processing. In the case that the pressure of a metal does not happen evenly, various thickness levels can be created at different points; this form results in an uneven object. The most destructive error is the shearing of a metal into interfaces or the partial detachment from its original mass; in that case the metal sheet will have to be recycled, as it is impossible to be processed (*Creese 1999*).

The processing techniques of metalworking were particularly successful in the rendering of ecclesiastical representations. Particularly popular was the striking technique, which is used for the formation of anaglyph representations and it is achieved with the aid of a small hammer, savati¹ and wired decorations (a decorating technique that is done by rotating wires).

1 Savati is the traditional name of the technique of niello (silver, copper, lead and sulfur alloy used for the decoration of mainly silver objects), it has flourished in Byzantium, the time of Renaissance and Russia in the 18th century. By this technique silver is colored in shades of black (*Thompson 1998, Oikonomaki-Papadopoulou 1980*).

The craftsmen, in order to produce forged objects, such as silver objects; they processed a metal sheet with an anvil (metal or stone surface of various shapes, in which the metal was processed), and with a hammer they were forming it accordingly, creating frequently several imperfections, which made them look handmade. Lathe was frequently used as well (a rotating machine that was held on a flat surface, with the purpose to circularly process the metal, under the force of a specific tool), in order to shape the sheet, the thickness of which is even in all its surfaces, by leaving thin circles. Small molded objects are manufactured into molds made of bronze or carved cuttlefish bone (the cuttlefish bone, when processed, was used either as a matrix or for the flattening of surfaces). “Mantefia” were also molds; there are iron frames (filled) with dirt that imprinted the pattern, in which molten metal was poured. Iron anaglyph or intaglio matrices had the same use as the latter; the processing of the sheets was made by using a piece of pencil, followed by use of “spitsouni” and chisels.

Engraved patterns required the processing of the metal sheet from the reverse side, which was immobilized in a special mixture of rosin², tile and oil, known as tar; in this way, no vibrations were created that could lead to the fracture of the sheet; that is the “upsurge” of the surface. The “carving” was occurring on the main surface, by filling the object with tar from the back side and afterwards it was processed with various tools. Frequently, parts of the metal were removed, in order to decorate it with perforated areas.

The processing tools vary according to the result each craftsman was aiming for. On their bench they have, a furnace, anvils, hammers for inflating, “spitsounia” (iron oblong tools with various endings, depending on the desirable shape), chisels (for the engravings), coppers (for the creation of perforated areas), “matakapi” (an oblong drill for drilling the metals), a screwdriver (for the creation of screwed pieces), a latch (tool with holes, from which the metal was passing through and in this way wires were created) and a “masgalas³” (for surface grinding) (*Universal Guide of Ecclesiastical Equipment 1998*).

Metal covers are attached in various ways to the books. The most common is with the aid of metallic nails that link the covers to the bindings. There are cases in which the covers are created precisely for the dimensions of the book, in a way that they can be covered with the garment that might exist in between, otherwise, they were clamped to the edges with metal joints. As a binding material, during the 17th century, they were using a mixture of gelatin (boiled wheat or rice pulp) and alum, which is a double salt of aluminum sulfate and potassium, while on the 18th century, rosin was also used, either in pure form, or mixed with alum. Evidence shows that in the bindings of the books, during the 19th century, different types of organic glues were used. Craftsmen, who had influences from the east, were using organic glue from wheat or rice, i.e. gelatin dissolved in water mixed with alum. Those having influences from the west were using organic glues, with main materials the bones, the cartilages (except those of pigs) and animal skin, such as the rabbit glue. There

2 Rosin is a kind of a stabilized resin, from which volatile terpenes have been removed by distillation. It is a transparent or translucent mass, in pale yellow or brown color, in a glassy form. Usually it has a slight odor or not at all. It is insoluble in water but dissolves sufficiently in alcohol and other solvents. It is heavily influenced by heat, but it is not subtracted (*Langenheim 2003*).

3 Masgalas is a tool that serves to grind the surfaces of the sheet metal and apply them around precious or semi-precious stones to the decoration of various metalworking objects (*Savvidakis 1996*).

was also a type of fish glue that was not particularly used (*Theodosis 2016⁴, Lepanto Central Public Library 2000*).

THE ENAMEL IN METALWORKING OF BOOKS COVERS

Enamel is a hard vitreous compound (glass in powder form, colored with metal oxides, which is mixed with an oily medium, creating a liquid pigment), which acts as a coating on the surface of the metal objects, either for decorative or utility purposes. This compound is a type of glass composed of silicon, minium and potash, which is colored by the chemical combination of several metallic oxides, while it is in a melted state inside a furnace. The composition of adamantine, which is a substance used on a metal, does not differ greatly from the enamels used in the ceramics and faience. The difference is, that the enamel in angioplasty, is usually applied on the rough surface of the ceramic while still in the raw phase; i.e. the compound has not flow or vitrified in the furnace by heat, as in the case of metal enameling; although, mostly, adamantine is in the raw state and is processed in a similar way to the one used in angioplasty.

Enamel application, is known from the Assyrians buildings and the Egyptian value items and jewelry. In addition, the Greeks and Romans were using it particularly in sculpturing, in jewelry and other miniature crafts, usually made from gold or silver, but also in copper alloys since the 6th century. The objects were intaglio and they were filled with enamel of various colors (Hess et al 1997, Encyclopaedia Britannica 2016).

Enameling is the gluing of the glass to a metal, through the melting process in high temperatures. The most suitable metals for this technique are gold, silver and copper, which was also the chronological order in which the technique was applied. Subsequently, it was also applied to the iron and steel. The definition is the same for the enameling of other objects, such as glass or ceramics.

Enamels are divided in transparent, translucent, opaque and auxiliary. Commonly, metal sheets of 1 mm are used, otherwise in the case that the thickness is greater the object will be very heavy. The metal should be flat and soft, without scratches, especially in the case that covering with transparent enamel follows, for a better aesthetic result.

The metal covering with enamel, requires a preparation of the surface. The patterns are either designed with a setsquare or merely by hand. One of the techniques encountered, is the known to the Byzantines, Cloisonné technique, which means “the processing of a cell”. This technique is known to many countries; studies have been carried out in regards to silver objects in Portugal, during the 16th century. The manufacturing process is similar, with the utensils, such as plates, to have at their center enamel decoration. The artists had great demanding, as wealthy clients from all over Europe were in search of such objects (*Ksanthopoulos 2007, Machado 2014*).

The first step is the manufacture of small cells, made of wire or thin films of attached metal, which were either welded to the surface or simply placed, and their stabilization was occurring through enameling. The wires are round or flattened, made of copper or silver, which go through processing by firing in order to soften (once they are out of the furnace, they are placed in cold water and subsequently they are rubbed with emery. Once the patterns are created, they are cleaned either with acid or with a solution of vinegar, water

4 The information are recorded after personal contact with the paper Conservator Mr. M. Theodosis.

and salt, which also happens in the metal that would be used, and finally, they are rinsed with water).

Subsequently, the empty spaces are filled with glass or enamel paste (the colors are the choice of the craftsman; in the past it was common to fill each cell with one color, while in the modern creations various mixtures are made) and the metal object is heated. The glass melts and enters the “cells”; in many occasions it is necessary for the process to be repeated. Finally, the enamel it is rasped and polished in order for the surface to reach the same level. The Cloisonné technique is the most known, however it is not the only one used for the enamel application (*Ksanthopoulos 2007*).

The appearance of this technique is also known from other occasions, which have been mentioned in the book decoration, not only of the ecclesiastical (a sample of the technique appears in Zakynthos – Greece, on a metal Gospel cover from the St. Mavra and Timotheos’ church). One of these is the book “L’email des peintres”, of the French artist and writer, Claudius Popelin (1825 – 1892), who in one of the copies (which gave as a present to a French earl) included in the back cover, colored enamel ornamentation. Enamel was, in general, one of the artist’s favorite materials and not only he was using it for his artwork but also he was trying to promote it to others (*Higgot 2014*).

CONCLUSIONS

Greek metalworkers had a variety of pure metals to work with since there were mines of silver, gold and copper in the region of the Mediterranean. Metalworking has a lot of findings to prove the great history and evolution of the craft and 19th century was that a time for arts and metalwork was one of them. New materials, tools and techniques were discovered and used, combined with the classic. Metalworking found a place to flourish in Zakynthos Island. The findings prove that the local elements have been incorporated in the classic techniques and created unique works of art and everyday objects.

Having a book covered was a common way to decorate it. A large variety of materials were used such as paper, leather, stones, metals etc. Metals seem hard to work with but an experienced metalworker could create a unique work of art. Silver, gold or various alloys imitating their color and shimmer, were such a spectacular view at a time that metals were very expensive and only a part of a city’s families or some of the churches could own, especially in Zakynthos Island.

This kind of metallic covers offered a touch of splendor in any church and proved that the holly books were an object with a special role in the religion. Their decoration showed not only the technique of the craftsmen, but also the knowledge and the important meaning that those books could share. Having the face of Jesus Christ, Virgin Mary or the Apostles on the book cover gave them an acceptance of being a secret object, even to the people that could not even read them.

The details of the decoration are so delicate and all worked by hand, with the help of specific tools used by the metalworkers. These tools are evidence of the inventiveness that a lot of the craftsmen built through the years, to try to perfect their way of working and as a result the metallic objects too. Metallic objects and book covers in particular are important not only as works of art, as some of them may be not, but as proof that arts and crafts are connected with a special way. Metalworkers found a way to use their knowledge to create objects that were to be used, in a household or for instance decorate a church giving them the opportunity to be a part of Greek art even if they were influenced by other cultures, and prosper through the years.

REFERENCES

1. **Borboudakis M., Agathonikou E., Lambraki- Plaka M., 1994**, The gates of mystery, Orthodox treasures in Greece, Byzantine Museum of Athens, Benaki Museum, Kanellopoulou Museum, Bastas -Plessas Publications (Ballian A, extract from the chapter for Benaki Museum ,Kakkavas G. extract from the chapter for Byzantine Museum of Athens,)Athens, (in Greek).
2. **Creese R.C**, 1999, Introduction to manufacturing processes and materials, Marcel Dekker Inc., New York.
3. **Encyclopaedia Britannica**, <http://www.britannica.com>
4. **Flemotomos D.**, 1991 Zakynthos' Technicians, Publications EOMMEX Athens.
5. **Giouri E.**, 1981, 4th century B.C. Greek metalwork, Archaeology Magazine, Issue 1 (in Greek).
6. <http://www.archaiologia.gr/wp-content/uploads/2011/06/1-5.pdf> 11/3/2016
7. **Hess C., Husband T.**, 1997, European glass in the J. Paul Getty Museum, The J. Paul Getty Museum, Publisher: Mark Greenberg, Los Angeles.
8. **Higot S.**, 2014, In periculofortis: A painted enamel by Claudius Popelin of Alfred- Emilien, comte de Nieuwerkerke, in context, 5th Biennial experts meeting on enamel on metal conservation, 17th-18th July 201, Ranger's House – London, ICOM-CC (Enamel Network Of the Glass & Ceramics and Metals Working Groups).
9. **Konomos D.**, 1981, Zakynthos Five Hundred Years (1478-1978), Volume Third – Part 1, Athens, (in Greek).
10. **Konomos D.**, 1989, Zakynthos Five Hundred Years (1478-1978), Volume Fifth, Art's Odyssey, Issue B, Religious Art – Architecture - Wood Carving – Silver's metalworking, Athens, (in Greek).
11. **Koufopoulos P.M., Mamaloukos S. V.**, 1997, Mount Athos Metalworking, Cultural Technical Foundation ETBA, Hellenic Ministry of Culture, Peloponnesian Folklore Foundation, Athens, (in Greek).
12. **Langenheim J.**, 2003, Plant Resins: Chemistry, evolution, ecology, and ethnobotany, Timber Press, Portland, OR.
13. **Lepanto Central Public Library "Papacharalabios", 2000**, Preservation and Conservation of Books and Archival Collections, Ministry of National Education and Religious Affairs, Libraries Department, Lepanto, (in Greek)
14. **Machado A. P.**, 2014, Enamels in Portugal from 12th to 17th century, 5th Biennial experts meeting on enamel on metal conservation, 17th-18th July 201, Ranger's House – London, ICOM-CC (Enamel Network Of the Glass & Ceramics and Metals Working Groups).
15. **Oikonomaki - Papadopoulou G. , 1980**, Ecclesiastical Silverware, ApostolikiDiakonia of the Church of Greece, (in Greek).
16. **Oikonomaki - Papadopoulou G. , 1998** , Ecclesiastical Silversmithery, Treasures of Patmos Monastery, Athens Publishing, Athens, (in Greek).
17. **Oikonomaki – Papadopoulou G., 1990**, Sinai - The Treasures of the Monastery of St. Catherine, Athens Publishing, Athens, (in Greek).
18. **Savvidakis E.**, 1996, Traditional Silversmithing Techniques, Archaeology and Arts, Issue 61,(in Greek).
19. <http://www.archaiologia.gr/wp-content/uploads/2011/07/61-13.pdf> 25/4/2016

20. **Tselikas A., 2006**, Mount Athos, Protaton Relics, Mount Athos Center, Thessaloniki, (in Greek).
21. **Thompson, D.V., 1998**, Οι τεχνικές και τα υλικά της μεσαιωνικής ζωγραφικής, Εκδόσεις Αρμός, Αθήνα.
22. **Voutyra M., Goulaki -Voutyra A., 2012**, Ancient Greek Art and its Glory, Center for Educational Research & Institute of Modern Greek Studies, Athens, (in Greek).
23. **Universal Guide of Ecclesiastical Equipment, 1998**, Ecclesiastical Orthodox Publishing, Athens, (in Greek).
24. **Xanthopoulos Th. N., 2007**, The Art of Enamel, Ant. Stamouli Publishing, Thessaloniki, (in Greek).
25. **Zagli –Boziou, 2009**, Guide for Kalarrites Village, Community of Kalarrites Village Publishing, (in Greek).
26. **Zora P., 1994**, Greek Art, Folk Art, Athens Publishing, Athens, (in Greek).